

Forest Insect Conditions on the
Bridger National Forest

1967

This report is an evaluation of current forest insect problems on the Bridger National Forest in 1967. Material for this report was compiled from previous evaluation reports, from aerial survey maps and data, from special on-the-ground evaluation surveys and by periodic examinations of special problem areas.

The most important forest insect problem on the Forest in 1967 was the mountain pine beetle in lodgepole pine. Other pests of concern were the spruce budworm, Douglas-fir beetle and Engelmann spruce beetle. Briefly, tree killing by the mountain pine beetle increased in portions of the Wyoming Division with some relief from the previously high population levels expected in 1968. On the Bridger Division, mountain pine beetle populations and subsequent tree killing also increased, but the outlook for 1968 is less favorable. High tree losses will continue in some areas and increase in others with little possibility of a letup of beetle activity in the foreseeable future. Spruce budworm defoliation increased considerably over that received last year, with even greater activity forecast for 1968. The situation is not critical, however, and no control is needed; at least not at the present time. Douglas-fir beetle populations, which have been on the decline during the past two years, decreased even further this year. Practically all Douglas-fir beetle activity was confined to one portion of the Forest. For the first time in several years, Engelmann spruce beetle activity in standing Engelmann spruce was detected in two separate infestations. A more detailed and comprehensive discussion of these various entomological problems follows:

Mountain pine beetle, Dendroctonus ponderosae

The current mountain pine beetle epidemic on the Bridger National Forest had its beginning in 1960, but it was not until 1961 that the first group of 60 to 70 faded lodgepole pines was detected in the Green River Lakes Campground. In 1962 additional mountain pine beetle activity of significant intensity was reported in the Greys River drainage in the Wyoming Division and near Willow and New Fork lakes on the Bridger Division. That year it was estimated that a total of 600 trees were infested and according to a biological evaluation of the infested areas: "None appear to be serious." This prediction was short lived for in 1963 the infestations in both divisions increased significantly, and by 1964, an estimated 4,600 trees were attacked and killed, and 692 infested trees were chemically treated in one area north of New Fork Lake. In 1965 the infestations in both divisions reached epidemic proportions and have increased in size and severity up to the present time. It is estimated that there are approximately 60,000 trees presently infested--15,000 in the Wyoming Division and 45,000 in the Bridger Division. A comprehensive discussion of the mountain pine beetle situation by Divisions follows:

WYOMING DIVISION

The incidence of red-topped lodgepole pine increased significantly over that recorded in 1966. The majority of beetle killed trees occurred in the Greys River from the confluence of the Little Greys River, south to Rock Creek, in scattered patches in the Little Greys River drainage, on the Forest and adjacent private lands along Strawberry and White Pine Creeks, and west of the Salt River below Christopherson Creek. The scattered infestations in mixed lodgepole pine--subalpine fir stands on the east side of the Division in South Piney and Cottonwood Creeks and the short lived outbreak in Robinson Creek near the Caribou National Forest border decreased to low levels this year. These and other infestations and those in the Bridger Division are shown on a copy of the aerial survey map mailed to the Supervisor's Office earlier.

Most of the mountain pine beetle outbreaks in the Division are concentrated in the lower portion of the main Greys River drainage. The oldest and most damaging infestations continue to exhaust lodgepole pine in Aspen Hollow, lower Murphy Creek, Dead Dog Creek, Grizzly Basin, Deadman Creek, and bordering both sides of the Greys River from Hot Foot Creek to Man Creek. Newer and increased beetle activity has shown up in Blind Bull Creek, Dead Horse Creek, and several of the smaller canyons to the north and south of Forest Park campground. Less serious but continuing infestations persist on the west bank of the Greys River between Elk and Rock Creeks. The only serious infestation on the east side of the Division that poses an immediate threat to uninfested lodgepole is in the lower reaches of the North and South Forks of Middle Beaver Creek. The persistent infestations on nearby Teton National Forest in the upper Hoback and on BLM, state and private lands surrounding Kismet Peak and Signal Hill exhibit marked declines and therefore, cease to be a threat to this area.

The most significant increase in tree killing occurred in Bull Hollow and although this is an isolated patch of timber there is sufficient lodgepole available to sustain the infestation at a relatively high, but slightly decreasing level through 1968. The number of red-topped trees observed in 1967 in the Christopherson-Gomm Creeks area will remain the same in 1968 but decrease thereafter. The older infestations in Aspen Hollow, Murphy Creek, Deadman Creek, Dead Dog Creek and the scattered infestations along the lower reaches of the Greys River are beginning to weaken and should exhibit a reduced attack ratio in the fall of 1968.

Biological evaluations were made in many of the most serious infestations during the period October 16-27, 1967. Performing these evaluations were entomologists Douglas Parker and William Klein. In past years, evaluations and subsequent trend predictions were based primarily on fall brood counts. We have learned through experience, however, that this method has not given us the correct answers. As an example, these data called for increased tree killing in Grizzly Basin, where actually a significant decrease occurred; conversely, a decrease was predicted for the Willow Lake infestation on the Bridger Division where, actually, a significant buildup occurred. We simply do not know enough about the biology or the

population dynamics of this insect to be able to predict, from such a cursory sample, and with a reasonable degree of accuracy, its trend so far in advance. Nonetheless, we continue to take systematic brood samples, for with them we gain information on the occurrence, cause and degree of natural mortality; they enable us to record relative population levels, and permit observation of the insects apparent physiological condition. Brood counts as sole indicators of population trend become more accurate the closer they are made to final emergence. Greater emphasis, however, was placed on obtaining attack ratios which more accurately depict present trend. Additionally, observations were made on woodpeckering activity (which was extremely heavy and apparently effective in some areas), stand composition, stand density and host depletion, attack density, and the relative occurrence of pitchouts and strip attacks. A list of the areas examined, their respective attack ratios, brood densities and corresponding trend estimates for both Divisions follows:

Division	Area	Attack Ratio		Average Fall Brood Density/Sq. Ft.	Trend*
		1966	1967		
Wyoming	Bull Hollow	1	2.3	132	Decreasing
	Murphy Creek	1.5	1	185	Static
	Dead Dog Creek	1	1.1	244	Increasing
	Grizzly Basin	7	1	164	Decreasing
	Deadman Creek	1.2	1	179	Static
	Forest Park	1.2	1	283	Increasing
	Christopherson-Gomm Cr.	1.1	1	94	Decreasing
	N. F. Middle Beaver Cr.	1	1.2	288	Increasing
Average		1.1	1		
Bridger	New Fork Lake #1	1	1.4	468	Increasing
	New Fork Lake #2	1	1.9	280	Increasing
	North Willow Lake	1	2.6	143	Decreasing
	Half Moon Lake #1	1.2	1	210	Increasing
	Half Moon Lake #2	1	1.7	165	Decreasing
	Little Half Moon Lake	1	1.9	148	Decreasing
	Burnt Lake	1	1	247	Increasing
	Boulder Lake	1	1	125	Decreasing
	Kelly Park	1	1	360	Increasing
	Miner Creek	1.4	1	197	Increasing
Average		1	1.5		

* Estimate of 1968 brood level from fall 1967 brood counts based on Sequential Sample Plan developed by Intermountain Forest and Range Experiment Station.

These data and other observations indicate a general reduction in the bark beetle population in most of the known infestation areas in the Greys River and in other areas of the Wyoming Division in 1968. Most of these infestations occur at lower elevations in predominately lodgepole pine type. It is these stands that have suffered the worst damage. However, with increased elevation, lodgepole pine gives way to Engelmann spruce, Douglas-fir and subalpine fir and it is in these mixed components where the beetle has begun to exhaust itself from within. An example of this is the striking decline in Grizzly Basin where, just a year ago, several thousand trees were attacked and killed. During the fall examination it was difficult to find a minimum of newly infested trees to sample. This stand is far from being depleted for even though many pine have been killed, many trees of susceptible size still remain. Woodpeckers were largely responsible for this significant beetle reduction for most of the 1966-67 brood trees were heavily depredated; the bark on many was almost totally removed. Woodpeckering may become an important factor in reducing the infestation level in many of the other infestations, since various degrees of this activity were recorded during the fall examination. Normally, most woodpeckering occurs during the winter months and its impact on the overwintering population cannot be effectively assessed until spring. Ips buildup, which is occurring in many areas, not only provides an additional attraction for woodpeckers, but their presence, in some instances, precludes successful mountain pine development.

No control is recommended for the existing infestations in the Wyoming Division because of declining tendencies there. The existing practice of emphasizing logging of mature and overmature timber in the Greys River and elsewhere as an effective and lasting control measure is commendable and should be continued. However, precautions should be taken to insure against surprise buildups in the contiguous lodgepole stands in the upper Greys River area for this would have serious consequences. Ranger District personnel and other Forest workers working in these areas should be alerted to this possibility and instructed to report any and all questionable activity at the first opportunity. These efforts by Forest personnel will supplement the aerial survey which, in the case of bark beetle detection, is always a year behind.

BRIDGER DIVISION

Tree killing by the mountain pine beetle increased considerably over that recorded last year. Damaging beetle populations continue to deplete lodgepole pine on the west side of the Wind River Range between the Wilderness and Forest boundaries. Many of these infestations are in, near or within view of prime recreation areas, notably New Fork, Willow, Fremont, Half Moon, Burnt and Boulder Lakes. Less serious but nevertheless active infestations persist along the lower fringe of the Forest boundary from Boulder Lake, south to the Sweetwater River and in the Miner-Packer Creeks area on the western side of the Division.

The single most serious buildup of beetle populations and subsequent tree killing occurred in the long stringer of timber north of Willow Lake. Ground examinations recorded a 260 percent increase in the number of lodgepole attacked in 1967 over that killed in 1966. Less significant but increasing buildup ratios also occurred in the infestations near New Fork Lake, Half Moon Lake and Little Half Moon Lake. Static tree killing occurred near Kelly Park, Burnt Lake and Boulder Lake. Biological examinations indicate no letup in either the intensity or extent of these infestations in 1968. The only possibility of a decline may be in the already seriously depleted lodgepole stand north of Willow Lake. This is easily the most heavily damaged stand on the Forest today and it is doubtful whether the beetle will be able to sustain itself at the present high level for more than one additional year.

The mountain pine beetle in this portion of the Forest appears to be following a general pattern of buildup, movement and depletion exhibited by other major infestations elsewhere in the Region. The initial buildup occurs in fringe type mature and overmature lodgepole on poor sites bordering extensive grass and sagebrush areas. After the initial outbreak, these areas, in part, provide the impetus for continuation of the infestation in adjoining areas. As the infestation continues, these marginal areas exhibit high buildup ratios and the infestation begins to develop in nearby interior stands. This movement into these interior stands is possibly a result of the following combined phenomenae: invasion from the older, adjacent infestations and localized population buildups from within. As the outbreak continues, and the infestation encroaches interior stands, individual tree groups coalesce into a seemingly homogenous mass of "red tops" and a full scale epidemic is in progress. As the infestation continues, the fringe areas become badly depleted, the point of the infestation runs into low diameter lodgepole pine and non-host type, the infestation loses its momentum, and eventually begins to exhaust itself from within. Heaviest damage occurs in the lower fringe areas while less mortality occurs in the interior stands, particularly those mixed with non-host type. In some areas and under certain conditions, upwards of fifty percent of all sawlog lodgepole pine will be killed before an infestation will run its natural course.

It is probable that many of the existing infestations, which are still in the preliminary stages of development, may spread into uninfested areas and possibly move, in some instances, inside the Wilderness boundary. Areas that exhibit this potential are those infestations between New Fork and Boulder Lakes. Almost all of these infestations are "fringe type", and although past experience suggests otherwise, there still remains a possibility that they will deplete themselves from within with minimum extension of infestation boundaries. However, most of the lodgepole pine along the Wilderness boundary are in a mature to overmature condition, and therefore, susceptible to mountain pine beetle depredation.

On the Bridger Division, tree killing will continue at a high rate unless effective control measures are taken. If we do nothing and allow the

beetle to remain unchecked, the overall consequences are uncertain. It is possible that many of the separate infestations will die out from within, and although additional tree killing will occur, the infestation will be restricted to scattered areas and not develop into an extensive outbreak. On the other hand, it is probable that the present infestations are precursors to a widespread epidemic which threatens all lodgepole pine west of the Divide. If this occurs, and present biological data indicates that it may, half of the existing lodgepole stands may be killed. Control, therefore, offers the three following alternatives:

1. Treatment of individual infested trees to destroy developing broods. For this type of treatment to be successful, all trees in all infestations should be treated, and continued for several successive years, until the beetle population subsides on its own. Although this method produces short term control benefits by minimizing immediate tree losses, it does not effectively reduce the beetles innate capacity for increase, nor does it change the conditions which triggered off and sustained the infestation in the first place--the perpetuation of contiguous stands of mature and overmature lodgepole pine. The trees saved now will only prolong the infestation and their destruction by subsequent beetle populations is eventual. If, however, values are such that a delaying action is needed and can be afforded, then this mode of treatment should be considered.
2. Accelerated harvesting of mature and overmature lodgepole pine. Some immediate control effects of local significance can be obtained by concentrating logging activities in presently infested areas; this would, however, have little overall effect on the infestation as a whole. Long term, lasting benefits can best be realized by concentrating logging activity in beetle free but potentially susceptible mature and overmature lodgepole stands of greater value. The faster these susceptible stands can be broken up and converted to a youthful growing state the sooner mountain pine beetle control will be realized.
3. Individual tree control combined with intensified logging. Once again, in considering single tree control, present and future resource values and other benefits should be carefully weighed against present and projected control costs. As such, this would be strictly a delaying measure to save currently threatened timber until it is logged and/or the beetle subsides naturally.

Spruce budworm, *Choristoneura occidentalis*

The spruce budworm infestation on the Wyoming Division is the second largest infestation in the Region today, and it is the only infestation which experienced heavy defoliation. The infestation was discovered in 1965 with most of the damage confined to Bailey and West Bailey Creeks. In 1966 the outbreak intensified overall, increased in size in the

Greys River drainage, and spread northward into the Grand Canyon of the Snake River. In 1967 the area of discernible defoliation almost doubled that mapped the year before with the infestation boundaries extending into portions of the neighboring Targhee and Teton National Forests. A yearly summary of infested areas since the beginning of the outbreak by damage categories as determined by aerial surveys follows:

Year	Defoliation Intensity			Total
	Light	Medium	Heavy	
1965	10,000	---	---	10,000
1966	33,000	800	---	33,800
1967	19,500	30,700	1,600	51,800

The present distribution is shown on the Forest's copy of the aerial survey map. The adjoining infestations on the Targhee and Teton National Forests are mostly confined to Cabin Creek (10,000 acres) and Martin Creek (2,900 acres), respectively.

Ground examinations made this summer during the budworm feeding period recorded light to moderate populations on Douglas-fir, subalpine fir and Engelmann spruce. The heaviest populations were found in Pine Creek with Douglas-fir incurring the heaviest damage. Subalpine fir and spruce were minor components of the stand and, proportionally, received less damage. Moderate populations and corresponding defoliation of equal intensity to Douglas-fir and subalpine fir were recorded in upper Bailey Creek which has now undergone three successive years of measurable defoliation. Light larval populations were recorded from all host trees in Porcupine Creek, in Elk Creek and along Stewart Trail north of Middle Creek. Aerial observers reported moderate to heavy defoliation of Douglas-fir in Roos Creek and to mixed Douglas-fir, alpine fir stands near the head of Stewart Creek. Small outbreaks somewhat removed from the main infestation were observed in Deadman Creek, Blind Bull Creek and Black Canyon.

These ground and aerial surveys were followed by a systematic collection and examination of spruce budworm egg masses on Douglas-fir foliage taken from representative areas within the infestation. Collection areas, egg mass counts per unit area of foliage surface for this year and last, defoliation estimates and trend predictions, where applicable, follow:

Location	No. Egg Masses/1000 Sq. In.		Percent Estimated Defoliation 1968	Trend
	1966	1967		
Bailey Creek	0.1	74.3 1/	90 - 100	Increasing
Higby Creek	-	5.0	25 - 50	-
Steer Creek	-	1.0	<15	-
Bull Hollow	-	18.4	90 - 100	-
Porcupine	5.7	30.9	90 - 100	Increasing

1/ As a matter of interest only, this is the largest egg mass count ever recorded in the Region.

Although defoliation was more severe and widespread than the year before, no trees or stands were seriously threatened. Most trees are able to withstand several years of repeated heavy feeding before permanent damage occurs. The first symptoms of this happening are dead terminal leaders and mortality of the suppressed understory. Generally, Douglas-fir is less able to sustain heavy feeding than either subalpine fir or Engelmann spruce. Engelmann spruce, unless it composes the understory, very seldom suffers heavy or lasting damage. In the present infestation the stands are relatively mixed and, in some cases, lodgepole pine is the dominant species. In other areas, such as in Bailey and West Bailey Creeks, the stands are open and contain a high proportion of subalpine fir. These stands will suffer the least. The areas that present the greatest hazard and are less likely to withstand repeated budworm feeding, are the mature Douglas-fir stands on the south side of the Snake River Canyon.

Biological data indicate no decrease in either intensity or extent of the infestation in 1968. Defoliation will increase in most areas, and unless natural biological factors intervene, the infestation will continue its spread into previous budworm free areas. Stands that contain a high percentage of Douglas-fir will suffer the most, but not to the extent that control measures will be needed, at least not in 1968. These and other areas will be closely watched for excessive budworm activity during the coming year.

Douglas-fir beetle, Dendroctonus pseudotsugae Hopk.

Douglas-fir beetle populations which began a general decline last year showed an even greater decrease in 1967. The relatively large tree group killing which occurred in Cottonwood, Mud, and Slide Canyons in 1966 declined to a low level this year. The serious outbreak in old growth Douglas-fir over the ridge from Squaw Fork Canyon was practically nonexistent this year. Field crews examined this relatively inaccessible area for signs of beetle activity, and although over a thousand trees had been killed during the last three years, no recent attacks, other than an occasional pitchout could be found.

The only remaining Douglas-fir beetle depredation of any significance is occurring in small, isolated 10-30 tree groups in steep, inaccessible canyons on the south side of the Snake River. Many of these dead tree groups can be observed from the Palisades-Jackson Highway. The largest single infestation contains approximately 90-100 trees on a steep, west slope at the head of the small unnamed drainage south of Dry Wash. The status of this and other infestations have not been determined, but if the present trend is maintained, the tree killing by the Douglas-fir beetle will decrease to an even lower level in 1968.

Engelmann spruce beetle, Dendroctonus obesus Mann.

Since the massive Engelmann spruce beetle outbreak in the upper Green River drainage and the culmination of control activities in 1964, this

bark beetle has remained at a relatively low level. Cursory ground checks were made for recent beetle activity in windthrow and standing trees near the edges of the Moose Creek sale and along the entire trail in Porcupine Creek, but none was found.

Aerial surveys, however, reported the possible occurrence of spruce beetle in standing trees in two other areas of the Forest. The first is in a long stringer of mixed spruce-alpine fir type on the south side of Roaring Fork Creek due north of Green River Lake Campground. Here, anywhere from 75 to 150 trees have been killed over a 500-acre area. The second infestation, although considerably smaller, is in the Wyoming Division at the head of Dry Beaver Creek. This infestation occupies less than 40 acres and involves only 15 to 20 trees. Because of their inaccessibility and pressing insect problems elsewhere on the Forest, these areas were not examined on the ground. However, once Engelmann spruce beetle activity becomes discernible from the air, the infestation either has a good start or it is well on its way to becoming epidemic. Fortunately, both infestations are in mixed type and separated from contiguous spruce stands. We will examine both of these areas firsthand this spring; you will be promptly informed of the findings at that time.



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